**Introduction**. Atopic Dermatitis (AD) is one of the most common chronic diseases of the skin, afflicting up to 30% of children and 10% of adults. Patients complain about redness, dryness and soreness of the skin, accompanied with a persistent, difficult to control itching, and associated sleep disturbances. AD often co-occurrences with other atopic diseases, such as allergic rhinitis and food allergy, and non-atopic diseases, including cardio-vascular conditions or psychiatric disorders.

Background of AD is complicated. Origin of this disease is often sought in the superficial layers of the skin, in the so-called *epidermal barrier*, which can be compared to a wall built of bricks (epidermal cells), sealed with cement (lipids filling the intercellular spaces), and covered with plaster (the cornified envelope). In AD, the described wall is leaky, due to impairments of the cornified envelope proteins, deficiencies and malfunctions of the lipids, as well as lack of some protective antimicrobial peptides. This leads to easier penetration of external factors, allergens and microorganisms, thus triggering the immune system, which in AD doesn't work properly in the first place. Inadequate immunologic response concerns plenty of cells, including the T lymphocytes and the Langerhans cells. These, along with the epidermal cells, are the source of *interleukins* – causers of the inflammation of the skin, which further contributes to epidermal barrier disfunctions.

By using biological therapy, with the help of the proper synthetic *antibodies* – proteins which selectively bind and block particular interleukins or interleukin-receptors on the surface of immune cells – we are able to mute the inflammation, reconstruct the epidermal barrier, and contribute to reducing exacerbations of AD, control its course and constrain its progression. Proper adjustment of such therapy in the terms of the *immunologic profile*, further increases its effectiveness.

**Aim of the project.** This project aims to improve diagnosing and managing of AD. Basing on the most recent knowledge, with the use of novel technologies, it refers to the yet unexplained scientific problems, popularizes the newest diagnostic techniques, discovers new potential points of treatment, proposes new prognostic indicators, and establishes the most time- and cost-efficient strategies.

**Description of the study.** In this project, three fundamental scientific problems are addressed. The first investigated subject is the influence of the recently discovered interleukins on the course and severity of AD, intensity of itching, and concomitance of other atopic and nonatopic diseases. Among the tested substances, prognostic indicators and potential therapeutic targets will be selected. Biological material will be acquired with the help of the novel *tape-stripping* technique – which consists of minimally-invasive extraction of the superficial epidermal layers by using a special adhesive tape. It can be used as an alternative for the so far used skin biopsy, which is a significantly more invasive method.

Another scientific problem tackled in this research is how the above-mentioned interleukins influence the occurrence of defects in the epidermal barrier, which will be assessed with an innovatory method of measuring the trans-epidermal water loss (TEWL). Additionally, the subgroup of patients with no existing mutation in the filaggrin (FLG) gene will be specified, as while this mutation is known to be responsible for defects in the epidermal barrier and skin dryness in AD, it is important to establish what is the exclusive influence of the interleukins on this barrier.

The last investigated issue is an attempt to determine the Polish *immunophenotype* of AD in children and adult populations, which is the immunologic profile characteristic for our geographic area, for each category of age respectively. A specified "standard" of the patient would constitute as an excellent point of reference to begin diagnosing and managing of AD, as well as prognosing its course. In the end, it would increase the yet unsatisfying effectiveness of the therapy.

**The reason for tackling the researched subjects.** AD afflicts a significant part of the population. The so far used symptomatic treatment usually doesn't bring satisfactory and long-term results. Scientific reports, as well as the collective conviction of physicians dealing with AD, clearly signalize the need for fundamental changes in approaching this entity, especially concerning personalization of the therapy. Many potential targets of such strategy still need further researches. It is crucial to improve standards of diagnosing and managing patients with AD, basing on the latest medical knowledge.

**The most important expected effects**. Results of this project will respond to the recent scientific problems concerning AD, while at the same time supplying new knowledge about this disease, its mechanisms, indicators and potential points of therapy, as well as encouraging other scientists to further investigate in this spectrum. Another expected consequence of this study is to prove legitimacy of putting modern diagnostic techniques over the ones used so far. By determining the Polish populational standard of the AD patient, we presume to significantly increase the process of diagnosing and implementing treatment.